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THE DESIGN OF THE CORDOBA CATALOGUES. EXTRACT FROM "AN ACCOUNT OF SOUTH AMERICAN ASTRONOMY"* GIVEN AT THE MEETING OF THE A. S. P.

By R. H. Tucker, Jr.

The list of the catalogues of the Cordoba Observatory is an epitome of sidereal work in the southern sky. The history of their design and execution is a condensed outline of the progress of astronomy, as far as it relates to positions of the stars, for the northern sky as well. The catalogues already published represent the principal lines of work of the northern observers up to the time of the foundation of the Cordoba Observatory, and in their proper order, while later undertakings will be found to be meeting the needs of southern astronomy.

Being condensed into a period of a few years, such problems as proper motion lie entirely outside their scope, and time enough has not elapsed to accumulate the great mass of separate determinations needed for the solution of others ; but this condensation itself adds to their value in other respects. It is a striking example of wise design and efficient, energetic direction. The time was ripe for the development of southern astronomy, and it was not necessary to originate means and methods to keep pace with improvements in instruments and in systems of observation, advantage could be taken of all that experience and practice had taught and the whole scheme carried forward without halt or repetition.

The main feature of the original design of Dr. Gould was the observation of a zone catalogue of the southern sky, similar in its purpose to the Zones of Bessel and others in the north. These zones are observed by sweeping with the meridian circle within certain narrow limits, and as many stars as possible of those encountered were taken. The result will be a catalogue of stars pretty uniformly distributed throughout the extent covered, but no limiting magnitude can be given to which the catalogue will be absolutely complete. The places will be accurate enough for the first determination, by comparison, of the position of a comet or asteroid, and it is pretty certain, from the formation of the catalogue, that a star near the position desired will be found among the zones observed, if any exists, as bright as the 9th magnitude.

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* Note.—Included in the original paper were discussions of other lines of work at Cordoba, such as the photographs of clusters, observation of comets and asteroids and latitude and longitude determinations; also, an account was given of the expedition to observe the last solar eclipse, and descriptions of visits to the observatories of Rio Janeiro and Santiago de Chile, and of the new observatory at La Plata in the province of Buenos Ayres.

The Zones of BESSEL cover the region between — 15° and + 45°.

ARGELANDER extended the work from 45° to the Pole, and also from — 15° to — 30°.

Besides these, the catalogues of LALANDE, D'AGELET, SCHWERD, LAMONT, RÜMKER, CARRINGTON, SCHJELLERUP and the sixth volume of the *Bonn Observations* can be included among those used for the same purpose as the Cordoba Zone Catalogue. Besides the above, there are zone observations at Washington, and others less consulted.

GILLISS' observations at Santiago cover the 20° nearest the South Pole, and the Cordoba Zone Catalogue fills the field between, extending from — 23° to — 80°. It contains, in round numbers, 105,000 observations of 73,000 stars, and was observed in the years 1872 to 1875, being published in 1884.

Previous to the arrival and during the mounting of the meridian circle, the observations for the Uranometry were made. This was the determination of the magnitudes of all southern stars visible to the naked eye. It thus includes such stars as were given in the earliest charts designed to represent the sky; but a more exact comparison is with the Uranometries of BAYER, ARGELANDER and HEIS.

The Uranometry, published in 1879, is thus the first step in the Cordoba scheme of observation, as the earliest charts were for the northern sky. Similar work had also been done in the south previous to the founding of the Cordoba Observatory. But the Uranometria Argentina includes all the stars thus listed, and yet is independent in its execution.

Following the Uranometry and Zone Catalogue, the Argentine General Catalogue gives accurate places by means of observations often extended for one star over several years, and it includes not only all the bright stars, but all those observed by any other southern observatory previous to that time.

These are such observations as have been made, and are still continued by the leading northern observatories. They are the foundation of modern standard star catalogues, and furnish the data for the positions given in the several almanacs. Incidental to the formation of the General Catalogue was the yearly computation of the ephemeris of the southern circumpolar stars, used for the determination of instrumental corrections, carrying out the analogy between astronomical work in the two hemispheres, even to the computation of needed ephemerides. The General Catalogue contains 145,000 observations of 32,000 stars, and was published in 1886.

Though not next in order, the scheme of united observation of all stars down to the 9th magnitude, usually referred to as that of the *Astronomische Gesellschaft*, should be taken up. That has been considered the most important astronomical undertaking of the century. For a basis it must have a complete enumeration of all the stars, to be observed by the meridian circle. This basis is furnished for the northern sky by the *Durchmusterung* of ARGELANDER. The sky has been portioned out to various observatories, Albany and Cambridge in this country being among the number, and the observations have been completed. SCHŒNFELD'S *Durchmusterung* extended the list to — 23°, and this region is now under course of observation. To that is joined the Cordoba *Durchmusterung*, which already extends to — 42°, and will furnish the list for southern observers. The meridian circle is already employed at Cordoba on the first section — 22° to — 26°, and previously had been used in the determination of the fundamental stars for this work, in combination with other observatories in the south.

Retracing the groundwork of this extensive design, the Gesellschaft system may be considered as the secondary triangulation, including all stars to the 9th magnitude. It is to be based upon the complete reconnaisance furnished by the *Durchmusterung*. The General Catalogue forms the primary triangulation, with much other work equally exact.

The Uranometry is the first reconnaisance, not necessarily giving anything that was not known with some degree of exactness before, but completing and improving the first efforts in the same direction. The needs of astronomy could not await their completion, and the zone catalogues, north and south, have fairly well filled the field, which will be completely covered when the last of the Gesellschaft scheme shall be concluded.

January 27, 1894.